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Fall 1998

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NO.120



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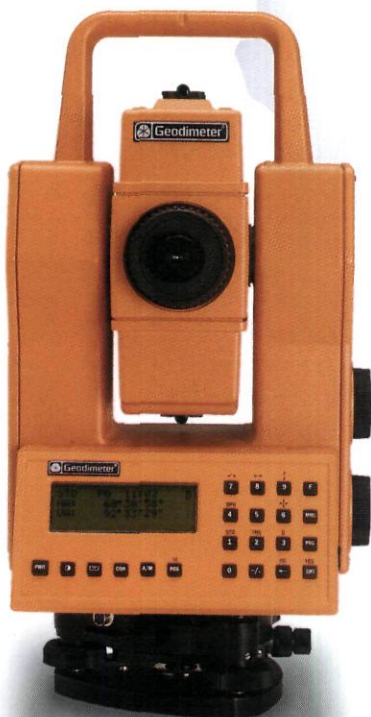
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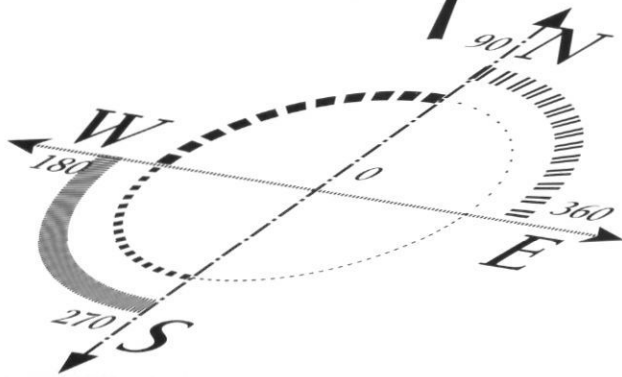
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"Recognizing that the true merit of a profession is determined by the value of its services to society, the California Land Surveyors Association does hereby dedicate itself to the promotion and protection of the profession of land surveying as a social and economic influence vital to the welfare of society, community, and state."

"The purpose of this organization is to promote the common good and welfare of its members in their activities in the profession of land surveying, to promote and maintain the highest possible standards of professional ethics and practices, to promote professional uniformity, to promote public faith and dependence in the Land Surveyors and their work."

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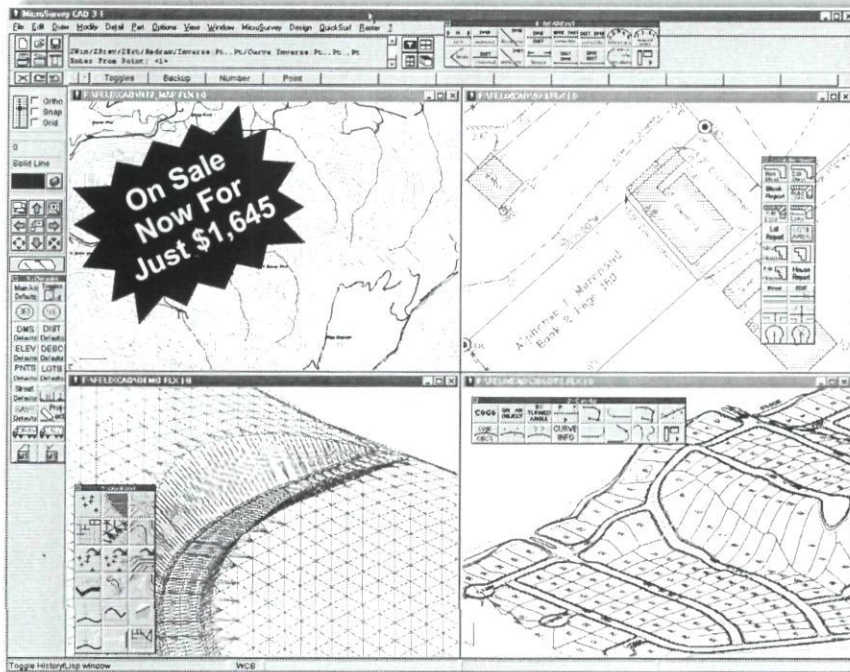
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On The Cover

NOAA performing a First Order Leveling circuit in Olema, Marin County, February 1989.

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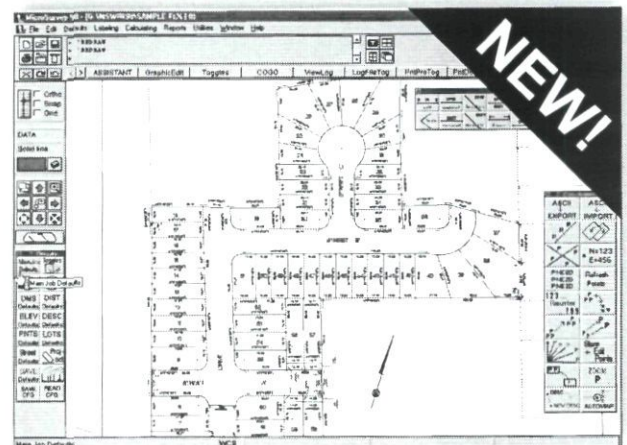
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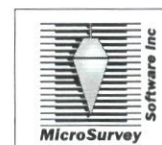
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From the Editor

Geomatics

By: Phil Danskin, PLS

This issue contains a hodgepodge of survey, (geomatic) related issues. Enlightenment on "geomatics" comes in the form of a well written treatise entitled Phoenix Rising: Geodetic Science and Surveying at Ohio State University. It gives reason for embracing this new term being batted around academia, (which happens to be 13 kilometers north of Eureka).

Upon reviewing the geomatics article the following quotes came to mind, (not really - they came from a book).

"Everyone is in favor of progress. It's the change they don't like."

"You may break a colt, but not an old horse."

"Nothing dies quicker than a new idea in a closed mind."

Being an old horse with a closed mind - my brain fought tooth and nail with Professor Hazelton's article. Here in America, most do not like change, (save, 1st marriages). With the resistance that some in our profession have towards metrication - geomatics won't come easy.

This is about semantics. It could take several generations before it is commonly understood to mean: A peculiarly-challenged profession. However, if Professor Hazelton is correct, we'll all be driving Mercedes and flying Mooneys! And he may be correct! Perform a search of "geomatics" on the Internet and you'll find about 48,000 hits! (I hope I'm not around when it becomes necessary to purchase multiple yellow page listings.) Hum. My mind is opening a bit, (that's a scary thought). Upon reviewing the entire article, should you have an opinion, do not hesitate to share it with us.

Also, in this issue is a response to a Subdivision Map Act question from Lisa Weil, an attorney with the law firm McCutchen, Doyle, Brown and Enersen. I hope you find this enlightening. With such copious enlightenment it may appear to be high noon while at midnight - with all the glowing Geomaticians all over our Golden State (albeit a certain dim one here in this locale). Thank you to Lisa Weil, Esq!

(Note: The Lot Line Adjustment Ad Hoc committee will continue to study these issues. Ralph Thomas, Sonoma County Chapter Representative, forgot to step back like the rest of us, and is now the Chairman of this committee. Also, CLSA News editor, Ted Kerber, shares The Attorney General Opinion No. 94-518, November 18, 1994, by Danny Boy. Members may obtain this AGO via our website: <http://www.ca-surveyors.org>, or ask your chapter representative for a copy). Our gratitude to Ralph and Ted.

While I'm on the Thankwagon, I would also like to thank our cousins who renewed their memberships and more importantly, to those who continue to serve the Association! So, if any dissenters would like to put that energy to good use, and do something positive for the profession, become involved, and/or re-involved, with CLSA.

"Faultfinding without suggestions for improvement is a waste of time."

And to paraphrase the little guy with the big ears . . . this is your association. Your partnership is liken to ownership. So act like a partner. Instead of complaining when he or she does not like the direction the partnership is taking, grab the bull by the horns and help steer! (Which would no longer be any bull!)

For those members or non-members who do not have a chapter - contact CLSA Central Office and we'll be happy to help form one. (Hint. Hint. Napa/Solano cousins!) Before I put all of you to sleep, I would like to reiterate my request for surveying photographs, articles and the like. I'm coming to the bottom of my Photo-barrel, my mind is . . . well, . . . rather empty. As for photos . . . the next cover might be a picture of one of my grandchildren -horns 'n all! ❖

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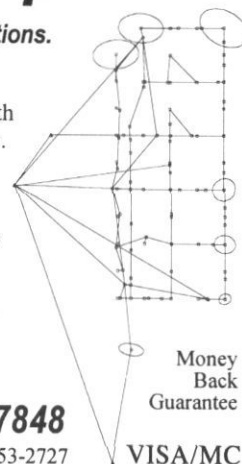
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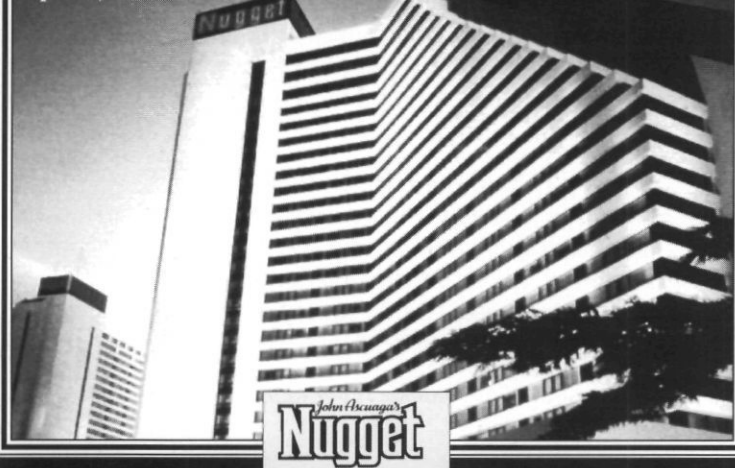
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Letters to the Editor

Dear Editor:

Kind of you to include me in your mailing of the "California Surveyor." In serving as a forum, your association has taken upon itself an almost impossible task. I'm sure you've taken some lumps as official "referee" among the many rare and rugged individuals practicing here in sunny California. My heart goes out to you.

Many of our breatheren are destined never to get along, much in the same manner of tigers never able to share the same hill. So be it. But, in order for any profession to succeed there must be some middle ground. This is sure to remain a "tough sell" among Surveyors committed to competition bashing and hoarding "proprietary" data.

Distinguishing oneself in the surveying profession, like all others, really means pleasing ones clientele by serving their needs, more than servicing ones ego. So, I note with disdain in a familiar acrimony, attitudes expressed by other Surveyors in your publication of late. A unifying force of dignity and moderation among us, like the rest of Californians, is nowhere to be found. Too bad.

For the record though, it might not be a bad idea for all of us to set forth a better standard of performance. The helter-skelter, hodgepodge of business-as-usual dealings by both government and the private sectors serve not the real needs of the public - if what's right on one side of the hill is wrong on the other. Municipal fiefdoms, and swaggering egos have taken their toll on the credibility and practicality of the profession, in a time where technology and a long history of survey standardization, should distinguish us. These trends do not bode well for our future.

Food for thought is unlikely to be found in any agreement if what's brought to the table remains unyielding. Flexibility and open-mindedness should be the profession's stock and trade. These worthy attitudes are slowly being strangled by the stronghold closed-mindedness one will find on either side of the counter, anywhere we go in California these days. That's a sad state of affairs. In the information age with the expertise and the high-tech equipment we have, the sky should not be our limits. The truth is that we lack a professional consensus.

Without this, what used to be everywhere, can do practical competence in a wide spread commitment to the sharing of professional common-ground, we ain't going nowhere worthwhile, anytime soon. We used to

Continued on page 10

There's Danger in Them There Hills!

By: Phil Danskin, PLS

Marin Journal - 23 December 1880:

SONOMA County has another bloody tragedy. Two brothers names Mullen were found dead last Thursday, in their dooryard. They lived ten miles east of Santa Rosa. Albert and Alfred Quackenbush gave themselves up to the officers, and were locked up, presumably for the crime. There was *land trouble* between the parties, and the courts were adjusting the disputes.

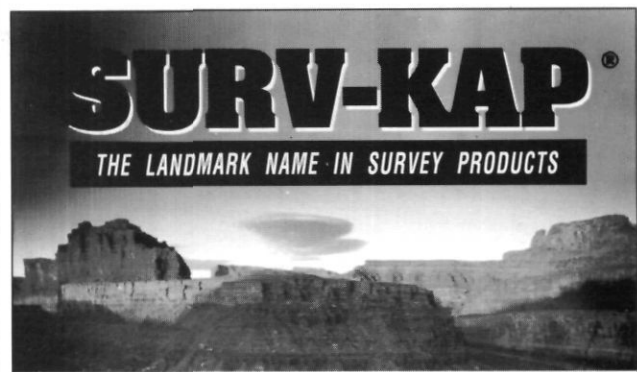
Happy Holidays? - Ed.

Marin County Journal - 6 June 1882:

Shooting of Alva Jewell

A murderous affray occurred on the Jewell ranch, Olema, last Thursday, which came very near ending the life of Mr. Alva Jewell. The difficulty grew out of a *right-of-way* which Mr. Jewell claims to be entitled to, and which is *disputed* by his neighbors, Mr. and Mrs. Smith. Mr. Smith had fenced the road, and Mr. Jewell claims fenced with lumber belonging to him. At all events he was there taking down the fence and we believe taking away the lumber on the day mentioned. Mr. Smith was not at home, and Mrs. Smith appeared on the ground armed with a double barrel shot gun and told him to not take away the fence, if he did she would shoot him. There are conflicting stories afloat about all the circumstances, but as they will be subjected to judicial investigation it would do little or no good to ventilate them. Suffice it to say, that Mr. Jewell, after parleying with Mrs. Smith, stooped down to pick up some lumber when she blazed away at him, as she had promised. The shot struck Mr. Jewell in the mouth and head, crashing out two or three teeth, and some shot being buried under the scalp. An intervening post received most of the charge and undoubtedly save his life. His hat is well ventilated by shot holes. He has so far recovered as to be able to attend to business. Mrs. Smith was arrested and brought before justice Gardner, who adjourned the examination until today, (Thursday) and held her in bonds of \$500 which she gave. The case was sent here by Judge Crandell of Olema, who was ill.

Continued on page 10



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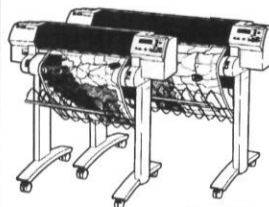
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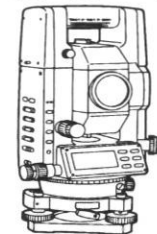
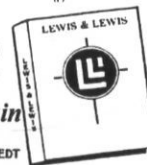
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There's Danger in Them There Hills!
Continued from page 9

San Francisco Chronicle - 21 November 1997:

Neighbor Killed Over Tree-Trimming
Mendota, Fresno County - Associated Press

A Mendota man trimming his trees was shot to death by his neighbor, according to Fresno County sheriff's deputies. Investigators said Santos Chavez was working in his yard Wednesday afternoon when his neighbor, 69 year-old Hector Ramirez, allegedly shot him several times. Investigators say there has been a *continuing dispute*, between the two men for several years. One report indicated the two had feuded over trimmings from Chavez's trees landing in the Ramirez yard. Ramirez was booked into jail. ❖



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Letters to the Editor
Continued from page 8

have plenty, but now we've got a new "Tin General" on each and every block. This ain't surveying, it's a p_____ing contest by a bunch of very short people.

Thank you so much.
David Bader, PLS 4366

Well, one cannot accuse you of mincing words. Thanks for the thoughts, cousin. - Ed.

Dear Phil:

Your "From the Editor - A Ten" article in the summer 1998 California Surveyor caught my eye today. To keep up interest in future conferences it is quite important to have good stories about those recently concluded - and you did.

Those who participated in organizing and doing the many time consuming tasks that go with such events appreciate the recognition you gave them; students in particular, from California State University, Fresno. I wish there were students from the University of California.

Sincerely,
Ira H. Alexander

Thank you Ira. You made me feel like I'm doing something right!
- Ed. ❖

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Thanks, Robert! -Ed

Some Thoughts on the Lot Line Adjustment

By: Robert J. Reese, PLS

The Association's appointed Ad Hoc Committee on Lot Line Adjustments (LLA) recently completed its compilation of various selected city and county processing requirements. If nothing else is demonstrated, the huge disparity of agency approach and ordinances shows that this creature of the Subdivision Map Act (SMA) has many interpretations. I would like to serve up some thoughts about the process for consideration by the surveying community.

There were several seminal forms of the SMA dating as far back as the Political Code of 1850, just after California was accepted into the Union. The evolution of the SMA continued throughout the next eight years, embodied in the Statutes. In 1937, the SMA was established by the Statutes within the newly created Chapter 2, "Subdivision Maps", of the Business and Professions Code (B&P) containing sections 11500 - 11628. Therein was an exception to the SMA as follows. § 11538.(b) Section (a) does not apply to any parcel or parcels of a subdivision offered for sale, contracted for sale or sold in compliance with or exempt from any law (including a local ordinance), regulating the design and improvement of subdivisions in effect at the time the subdivision was established.

Author's note: Subsection (a) made it unlawful to sell a parcel if not in compliance with the SMA it-

self. This was a broad exemption without the specifics listed under present SMA § 66412 (d).

The SMA migrated from the B&P Codes to the Government Code due to the Statutes of 1943. Its legislative taxonomic address became Title 7, Division 2, Chapter 1, Articles 1 et seq. However, the LLA exception in § 66412 (d) was first introduced in a 1976 amendment to Chapter 1 which listed the parental first sentence of the present exemption. A lot line adjustment between two or more parcels, where the land taken from one parcel is added to an adjacent parcel, and where a greater number of parcels than originally existed is not thereby created, provided the lot line adjustment is approved by resolution of the local agency. (See Deerings Government Code Annotated, §§61000 to 66499, pp 499 et seq.)

A 1977 amendment clarified some of the above wording. Only in 1985 did the next 4 sentences, further narrowing the exemption, appear. Today's LLA exemption to the SMA has substantively existed only 13 years!

I offer the following opinions regarding the LLA as a subdivision exception. LLAs were contemplated to be a pragmatic fix for situations wherein there were non-hostile problems of title lines vis-à-vis occupation lines (fence line divisions, building or improvement encroachments,

inaccurate land descriptions). The legislature sought to acknowledge, and allow, that there could be more than just two neighbors affected by such problems and solutions. Present law allows solution to problems by two or more parties by agreement to adjust or move their lot lines. Reasonably, this process ought not to be subject to the full scope of review enumerated by subdivision law. The resulting parcels of such a pragmatic solution, however, should be reviewed with respect to their compliance with present local lot configurations.

I believe present legislation never contemplated that the LLA be applied to reconfiguring lots that could significantly affect land use or configuration. When a LLA shows up that looks, sounds and feels like a subdivision, the natural response of a governmental agency - whose legislated purpose is to review and condition subdivisions - is to impose the same level of review regardless of explicit limitations on review. So an agency response is to create major or minor LLAs, fully conditioned LLAs, LLAs subject to planning review and public hearings and many conditions that the law says specifically are not to be imposed. The law is clear. Why is it that local agencies insist on illegal processing of these LLAs? Because these projects look just like any other subdivision that comes in for review!

The LLA process has been applied very creatively. Proposed subdivisions, particularly those in areas of high density, environmental sensitivity or areas politically disposed to low (or no) growth, have the misfortune of being poked and prodded by many different departments of a local agency with a myriad of conformance criteria. (The image of the resulting project that comes to mind is the turkey on the day after Thanks-

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Q&A Subdivision Map Act

Question:

What discretion do cities and counties have in approving lot line adjustments?



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Answer:

In approving a lot line adjustment the local agency's review is very limited. Under Government Code section 66412(d), the local agency must limit its review to a determination of whether or not the resulting parcels conform to local zoning and building ordinances. The local agency cannot require a tentative map, final map or parcel map as a condition of approval of the lot line adjustment. In fact, the only conditions the local agency may impose are:

- (1) conditions to make the resulting parcels conform to the local building and zoning ordinances;
- (2) a requirement for the prepayment of real estate taxes; and
- (3) conditions that would facilitate the relocation of existing utilities, infrastructure or easements.

The limits on local agency discretion were confirmed in the case of *San Dieguito Partnership, L.P. v. City of San Diego*, 7 Cal. App. 4th 748 (1992); the court rejected the City's attempt to limit lot line adjustments to only "minor" changes in lot lines. The court held the local agency's review is "strictly circumscribed" and it must approve a lot line adjustment so long as a greater number of parcels are not created and the parcels are adjacent to one another.

Even after *San Dieguito*, some local agencies still try to impose more conditions on lot line adjustments. For example, they may impose the condition that the resulting parcels not create more buildable lots, or require a determination that the pre-lot line adjustment parcels conform to the building and zoning codes. It will probably be just a matter of time before the rule of *San Dieguito* is tested anew in the appellate courts.

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giving.) I too have presented projects in my area that triggered the local agency review reflex. You probably know of similar projects that have revealed ancient subdivisions whose unused, underlying lots seems to be lying in wait for reincarnation as cluster subdivisions with reserved open space.

What's my point? I wonder about two things. I wonder if the LLA process were codified in, say, the Land Surveyors Act, if it were clearly limited in its application to situations that adjust recognized subdivision lines in current use, if it were designed to give redress to persons seeking a solution to their real property problems and if it were required to be mapped with a Record of Survey and monuments set that define the adjusted lines, then would this obviate the issue of agency review?

I also wonder what would be the legislative replacement for the wholesale reorganization of an existing subdivision's lot lines. Article 2, Definitions, would need to include a Resubdivision definition, as well as determinations of recognized lots available for Resubdivision. The review process of the resubdivision needs to recognize that the existing lots have associated bona fide ownership issues as well as level of current use. The local agency review process would consider proposed configurations for compliance to local ordinance and general plan.

There is a considerable amount of commerce based on LLA exemptions. I have benefited from the LLA exemption as well as my clients. There has been a notable amount of LLA litigation. The private sector sees the LLA exemption as respite from the financial parasitic effects of increased bureaucratic review. Some local agencies see the LLA exemption as an erosion of their legislated authority to regulate subdivision and control growth and react with increased restrictions. But if used as a solution to real property problems, the LLA can allow surveyors to professionally serve their clients and improve the public's opinion and image of surveyors as problem solvers. ❖

Broadening Surveying into Geomatics:

Are We Promoting Obesity, Fattening the Calf for Slaughter, or Living off the Fat of the Land?

By: N. W.J. Hazelton

Abstract: The voices raised against Surveying's name are numerous, and most are motivated by the need to invigorate the profession. But surveying in the USA is a different beast to surveying in other countries. The public perception of 'surveying' is narrow, and this has a significant impact on people who are looking for a career. Efforts to broaden the public perception of surveying do not seem to have had much impact. The impact of new technology has filtered through only slowly to the practicing professional, who seems more concerned with boundary surveying than any other activity. Meanwhile, an ongoing discussion of the relative merits of 2- and 4-year qualifications, if any, for beginning the registration process continues, with 4-year degrees often accused of killing the potential for growth in the profession. Such degrees are sometimes seen as simply padding out a surveying curriculum in order to keep academics employed, teaching stuff that no surveyor ever really uses. Another wave of new technology is about to descend upon us. Spatial data collection is about to become even easier. What is left for the traditional surveyor? How do we move the surveyor's spatial skills into the 21st century?

INTRODUCTION

The history of surveying and its importance to society go back thousands of years. The US surveying profession lauds Washington, Jefferson and Lincoln as surveyors, but without ever explaining what they achieved as surveyors beyond becoming presidents. That they were great men and important presidents is not disputed, but their being surveyors seems incidental to everyone apart from other surveyors.

The public perception of these three men as surveyors is almost non-existent. Washington has the reputation of being a meticulous and honest surveyor, but that could be viewed as a back-handed compliment to the profession by suggesting that many surveyors are not meticulous and honest, and casting Washington as the exception. The public are not aware of Jefferson as a surveyor, and his involvement with the PLSS is widely unknown. That Lincoln was a surveyor at one time seems historically irrelevant, something for trivia buffs.

The public perception of surveying comes in two parts. The first is as a group of people who decide and mark out boundaries of property. The second is as a group of technicians who are seen out on the roads in summer, along with the other bugs. It can be argued that surveying is not a profession, despite the efforts of quite a few surveyors to make it one, as it most certainly isn't seen as a profession by the general public. The lack of attention that the Ohio State University (OSU) surveying program attracts

on open days, even among people who are interested in the engineering disciplines, is quite instructive. In Australia, a career in surveying is seen as a stepping stone into the professions for people who don't come from a professional background and is sufficiently prestigious for people from professional families. In the US, surveying is perceived as an occupation requiring limited skills and having few opportunities.

Sixty years ago, there was real skill and art in being a surveyor. Extracting the required precision from recalcitrant tapes and theodolites; being able to fill in the details on a plane table mapping survey by eye and hand; determining levels with awkward equipment; computing results with tables, mechanical calculators (if you were lucky) and the trusty slide rule (for rough work)-these were all manual and mental skills that took time, often many years, to master, and excluded a great many people from the profession.

Today, technology allows anyone with a modicum of intelligence to operate a total station (or have it follow you around), a GPS receiver or a digital level. Computations are simple and in many cases you can buy a package that does all the work for you. What's left for the surveyor to do? It is well-recognized that measuring the right thing is critical, so the surveyor tends to leave instrument work to the crew and concentrate on getting the right data in the right way. But does that make the surveyor a professional?

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THE ISSUES

There are several significant issues with which we have to deal. These can be listed as follows:

- Is surveying a profession and does it matter?
- What does surveying do for society and does that matter?

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- How are we going to deal with the continued influx of new technology?

These issues have a major impact on us as educators in the surveying field. We cannot make surveying a profession, but we can have some effect. Our perception of what surveying does for society should have a major impact on what and how we teach. Dealing with new technology is a challenge that we have to face in order to bring the next generation of surveyors into society in a state of usefulness. It is the resolution of these issues which dictates why, how and what we teach, and how we shape the profession in the future.

Arnold Toynbee, the great historian, said that all of history can be written in a simple little formula-challenge, response. The challenge is created by the environment, and then the individual, the institution, the society comes up with a response. Then there's another challenge, another response. The formula is constantly being repeated. (Covey et al., 1994, p. 53)

The problem is that these responses become codified, formalized and thus set in concrete. They become part of the very way we think and act. They may be good procedures and practices, but when we are faced with a new challenge, the old practices and procedures become obsolete and are no longer applicable to the new challenge. We live in a very segmented, mechanistic, reductionist society, like most of the rest of the world, and this keeps us in a sea of constant change. So we cling to practices and structures and systems for some sense of predictability and regularity in our lives. And little by little, the succession of challenges rubs out these anchors in our lives.

IS SURVEYING A PROFESSION?

A strong case can be made that surveying is not a profession, despite the plethora of 'professional surveyors', 'professional land surveyors', 'professional surveyors' organizations and the like. Society-at-large makes a group a PROFESSION on the basis of its meeting certain criteria. Professions are not made by self-proclamation (e.g. McCormac, 1985, p. 360). This doesn't mean that a group cannot become a profession.

The history of medical practice which moved away from the barber-surgeons and apothecaries and into the domain of the College of Physicians in England during the 17th century is most instructive. The role that individuals can play in such a process, and the integrity of the profession and its members during times of change, are particularly relevant to moving surveying into the realm of the professions. The story of William Harvey and the examination of 'witches', together with the way that Harvey's meticulous and objective examination was able to over-

come the prejudice and obsession of King James I himself, provides an object lesson in the value of professional integrity (Keynes, 1966).

Of particular relevance to us is the emphasis that the medical profession of the time placed on education, particularly continuing education, in the development of the profession and the College of Physicians. Not only is there an important role for educational institutions in this process (Keynes pays particular attention to Oxford, Cambridge, Padua, Leyden and several other 16th and 17th century universities), but the involvement of the College of Physicians in providing what we would term 'continuing education' is another significant feature. In addition, while many physicians of the time held Bachelor of Arts degrees, a number of the leading members of the profession also held doctoral degrees, even in the early 17th century (Keynes, 1966).

Does it matter that surveying is not viewed as a profession in the US? On the one hand, the view is that it does not, as the number of surveyors in the US seems to be declining, owing to the rapid introduction of new technology. In time, the number of surveyors will be too small to make an impact. On the other hand, the present reputation of surveying in the US tends to discourage interest by potential members of the profession who feel that they could do a lot better in other fields. It is very easy for these arguments to be self-fulfilling prophecies of doom.

The question we have to consider is how we can make surveying a profession worth entering.

WHAT DOES SURVEYING DO FOR SOCIETY AND DOES IT MATTER?

It has been stated that "boundary retracement is the centerpiece of the surveying profession's contribution to society." (Leininger, 1997, p. 22) In the same article, the author castigated 'the GIS/geodetic science/GPS community' for suggesting that boundary retracement was a disdainful practice with a limited future, and that surveyors would be better to abandon it for some automated system and move on to more interesting and useful things. It may well be that boundary surveyors see this to be the case; after all, it then makes them the most important part of the profession.

It seems that if this is indeed the profession's view, then the profession has lost itself and its role in society. It has latched on to a practice, which is actually just a technical process, in the middle of a swirling sea of change and failed to appreciate the big picture, the whole idea of why boundary retracement is done. It is rather like civil engineers claiming that Finite Element Analysis was the centerpiece of their profession's contribution to society.

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Look at the OECD (Organisation for Economic Cooperation and Development) classification of countries that are developed compared to those that are not. There are a number of differences, most of which are used by the OECD to make the differentiation. But one that they do not use, but which exactly follows the classification is this: all developed countries have a single, efficient land market.

The surveyor's contribution to society is to provide the support to this land market, by being able to ensure the spatial integrity of the cadastre. Only part of this is boundary retracement. The National Geodetic Survey does its part, with all its geodetic science and (in recent years) GPS people, tying together the entire country, so that the ground surveys of the past will match the satellite surveys of the future. The GIS people do their part, trying to bring together the various pieces of the cadastre in a meaningful way, despite the horribly fractured mess that constitutes property boundaries in many parts of the US. Of course, if the land ownership and property boundary systems are set up efficiently, a surveyor is not needed to do much in the way of boundary retracement. You do not need a surveyor in Britain to run your boundaries.

It is unfortunate that among the developed countries, the US has the most antiquated and inefficient cadastral system. Look at Europe and Australia, where the cadastre has evolved so that the system is not regularly shaken by uncertainty in boundary location of the order of tens of meters, where the concept of a 'fraudulent survey' is unknown, where a slip of a meter in a remote boundary in low-value country will lead to a surveyor's deregistration (his loss of income far outweighed the value of the land involved), where you do not need the massive duplication and infrastructure of title companies because the system does not have the massive holes that need that kind of patching. These aspects, too, are part of the US surveyor's contribution to society.

What is the significance of the land market to whether or not a country is 'developed'? There are three main points here. Without the stable land market and cadastre, the idea of a mortgage is untenable, and this means that the main source of finance for development is not available. Second, without the guarantee of ownership, there is little incentive for stewardship of the land and care of the environment. There is almost no 'slash, burn and move on' agriculture in the US or other developed countries. Finally, land gives people security and society stability, and allows for the rise of the middle classes, which are one of the mainstays of the state of being 'developed'.

In the early 19th century, there was considerable discussion in Europe as to which would be the major eco-

nomical power in the Americas. It was considered that Argentina was as likely to become dominant as the US. Today, there is no doubt as to who dominates. Without a stable system of land ownership, guaranteed by the surveying profession, the US would probably be in much the same position as Argentina is in.

That is what the surveying profession has done for the US. It has given the country the financial and social stability to become what it is today. The US surveying profession does not even recognize what it has achieved, and certainly has not got this message across to the public. Does surveying's contribution to society matter? Of course it does!

HOW ARE WE GOING TO DEAL WITH THE CONTINUED INFLUX OF NEW TECHNOLOGY?

How do we usually handle new technology? We tend to try to fit it into the current way of doing things. After a while, someone thinks back to what we were trying to accomplish in the first place, re-thinks the process using the new technology, and a new practice is developed. We can see this with the arrival of total stations. Total stations do not work very well without some computer system to process the large amounts of data they collect. When total stations were first introduced in the mid-1970s, we tended to work with the traditional separation between horizontal and vertical co-ordinates, but we no longer have to do that. Someone re-thought the process.

In geodesy, we traditionally computed geodetic figures on the ellipsoid of choice, but with additional computer power and availability, we now work in geocentric 3-D systems. In photogrammetry, we once used analog methods of solving the problem of restitution of the stereo-model, with the Kern PG-2 being perhaps the most elegant analog computer built. Now, we can use digital photogrammetry to produce a dense DEM of thousands of points in minutes, and then use that information to produce a digital orthophoto in another few minutes, with most of the process being completely automatic.

Sometimes, the new technology changes not just how we undertake our work, but the whole concept of what we are trying to achieve. At times like this, we have a major shift in our conception of what is going on and where we belong in the process. We are in one of these times now, as technological changes have reached a point where we need to re-think everything that we do, re-define our place in this re-thought model, then build a new set of processes that allow us to achieve the profession's goals and obligations to society.

This is the challenge that the profession's environment has produced. The response will determine if the profes-

sion has a future, whether it is actually a profession, and what we do about this new technology.

It almost goes without saying that the educators of our future surveyors have a major role in this process.

GEOMATICS

There does not yet seem to be a universally accepted definition for 'geomatics', but it tends to be commonly used as a generic term to encompass the processes involved in collecting and storing spatial data. In some areas, it is seen as a means of describing what is involved in setting up and running a GIS. Elsewhere it is seen as including surveying, photogrammetry, geodesy, mapping, GIS, LIS, AM/FM and a range of related activities. The common thread is collecting and dealing with spatial data.

We can consider geomatics to be the study and practice of dealing with spatial data and information in any form in which it may occur. It includes all of the above areas from surveying to AM/FM but has a more holistic approach to the entire subject area. It is also oriented towards dealing with spatial information throughout its entire life and use, rather than being restricted to any one particular area.

Most academic surveyors see the declining interest in surveying, the pressure on jobs caused by new technology, and the low standing of surveying in the community, and are trying to ensure that the vital role of surveying is not lost. If this means that we expand our imagination and seek new fields in which the surveyor's spatial data handling skills can be utilized, does this justify the castigation we receive from various parts of the professions?

We should make the important distinction here between data and information. Data is simply facts, generally in very small pieces. Information is data that has been structured, ordered, processed, filtered, selected and otherwise manipulated to accomplish some purpose. Figure 1 shows a conceptual overview of geomatics and where it fits in the process of dealing with spatial data and information.

Traditionally, surveying and related disciplines were concerned with the various transformations involved with get-

ting data from the real world into some kind of a map. Geomatics includes that, but goes on to be concerned with what happens to the information after the map has been produced. Here the geomatics professional is much more concerned with how the information is used, how the entire process supports various decision-making processes, and how to maximize the information produced for the required purpose.

The processes that convert the collected spatial data, which we can call, very loosely, a map, into decision support products, which we can call, again very loosely, information, include transformations, but these are incidental to creating information. The purpose is to get the information out of the data. Transformations are no use for this, because we need to combine the database with the knowledge base related to the specific problem we are dealing with, and extract the appropriate information. The only term that describes this in a generic way is 'pattern recognition'.

In order to combine the spatial database with the problem-specific knowledge base requires an understanding of the peculiarities of both the spatial data and the problem domain. This combination may not occur in one person,

which leads to the need for the spatial data expert to be able to work in a multi-disciplinary group, and understand what the problem is from a multi-disciplinary perspective.

GEOMATICS VS SURVEYING

In the US, the popular perception of surveying relates to boundary surveying. The various Boards that have legislative control of surveying seem to limit their interest to boundary surveying, and the examinations taken to become a professional surveyor are predominantly concerned with boundary surveying.

Elsewhere in the world, surveying is taken to mean a much broader range of activities, including geodesy, photogrammetry, mapping, cartography, LIS, AM/FM and even GIS, in addition to cadastral, engineering, topographic, hydrographic, mining, industrial and control surveying. A

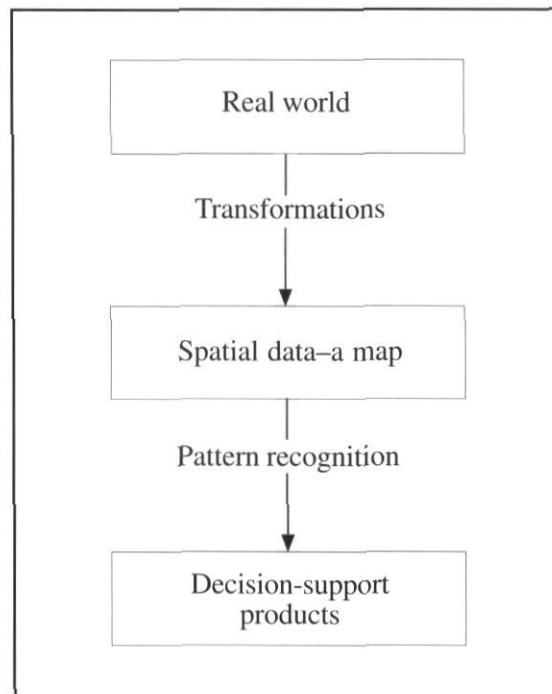


Figure 1. The Domain of Geomatics.

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We cannot decide that we will jump into geomatics and expect that we will automatically achieve this place in society. We have the skills and people to move into that role, especially considering it is one that we already have in part, albeit unconsciously. We need to convince the larger community that geomatics can make a significant contribution to our society, and that the integrity and standing of its practitioners will make it a profession. This is a long-term project, but not impossible to achieve if we can work on it together.

THE NEXT WAVE OF TECHNOLOGY

Some time this year, satellites with 1-meter ground resolutions will be lofted. You will be able to download the imagery over the Internet, within hours of the satellite passing. Each area can be covered every 16 days, although it is possible to re-image it every 4 days by ordering ahead. Stereo imagery will be available. One-meter ground resolution will enable mapping at scales of 1:2,500, which means that it will be possible to produce most maps from this imagery. With the ability to use digital photogrammetry on ordinary PC hardware to produce a map in a matter of days, the idea of a map being a static snapshot starts to fade, together with the idea of there being years between map revisions.

Many authorities are building LIS at a county level and integrating a large amount of cadastral information. The work required to check boundary surveys and integrate them into the system is generally too expensive to allow the cadastral system to be updated. But there are techniques being developed in 'computer vision' that can be applied to cadastral databases to search for a range of different incompleteness and incongruity, which could be applied to scanned data and run with minimal human involvement. What does this mean for the boundary surveyor, when corners are defined by co-ordinates and are able to be re-established by GPS by anyone who can press the right buttons?

With such an LIS, integrated with the 1-meter resolution imagery, what need is there for mortgage surveys? A title company can just down-load the required data, superimpose the two data sets, add the local ordinances and their own information, and, in the vast majority of cases, see immediately if there are any problems.

Mobile mapping allows a vehicle to run at 35 mph or more, taking digital images with a stereo camera arrangement, and use its GPS and inertial control to co-ordinate objects in the images. If these data were integrated with the 1-meter satellite imagery and the county LIS, a large number of the monuments used in boundary surveying could be mapped quickly and cheaply, allowing the county LIS

to be refined to the point where it could represent the official cadastre. How does the local surveyor compete with companies that can run this kind of technology?

GPS can now deliver high precision very quickly, and we now have circumstances where we can digitize for a spatial database at 1:1 on the surface of the Earth. There are robotic total stations that require a single field person, while the total station handles measurement, tracking the field person, data reduction and storage, and down-loading to a field PC, which enables the field work to be checked against existing data in a matter of seconds. GPS and total stations can be integrated, so that we only have to worry about the final co-ordinates and the associated attribute data, while the means by which these data were collected is largely unimportant. Is there any difference between walking around with a data recorder that collects GPS data, or walking around with a data recorder and reflector that collect total station data? We can see that the procedures are not terribly important any more; it is the fundamental principles that count (along with the actual data, of course).

What we can conclude from this next wave of technology is that it will force us to re-think what the whole idea of the work is, rather than just modify the procedures. If the whole idea is strengthening and supporting the cadastral system, it doesn't matter if you do it with a tape and transit in the field, or with a collection of databases on computers in an office. If we are achieving the big goals, the details of the procedures do not really matter at this level. If it is cheaper and better to use one particular method over another, which is more likely to be chosen? If I have to get to a place 20 miles away in an hour's time, I can run, ride a bike, ride a horse, drive a car, take a bus (if one is going that way) or use any combination of these transport modes. But how many of us would just take the car, it being easier than running or riding a bike, probably cheaper than keeping a horse, and much more convenient than taking the bus? And when we arrive, who will really care how we got there, provided we actually arrived on time?

CONCLUSIONS

In this paper, the discussion has focused on what the name 'geomatics' can do that the name 'surveying' can not. 'Surveying' is seen by with general public, as well as a large part of the profession, as being concerned only with boundary surveying and some technical surveying. 'Geomatics' is concerned with dealing with spatial data and information across the entire spectrum of its use, and with the process of integrating knowledge bases and spatial databases in a decision-support environment.

'Geomatics' describes much more closely what many 'surveying' departments at universities actual do, as well as providing a means for integrating all the various sub-disciplines in the geomatics field. It could be considered a much more honest description of what we teach and research, letting prospective students know that there is more in the field than just surveying.

The contribution that geomatics can make to society includes what surveying already contributes, namely a spatial data co-ordination system, which provides a means of supporting the cadastral system, which, in turn, provides a major underpinning for the national economy and the environment. In addition, geomatics gives us the opportunity to consider how we can integrate expertise in spatial data and information handling with the knowledge bases of other disciplines. The geomatics practitioner is a multi-disciplinary player, someone who can bring other experts and non-experts together. In our reductionist world, such a person is a major asset to the society.

The new wave of technology promises to force even more re-thinking of what we are trying to achieve through what we do, and how we can achieve it as efficiently and effectively as possible. If we can base geomatics on fundamental principles, rather than a collection of facts and procedures, we can educate the next generation of graduates to deal with the next wave of technology before it has actually appeared.

These are the challenges ahead of us. Geomatics, as a discipline as well as a name, is one response. It may not be the best possible one, but it seems to be the only credible one at present.

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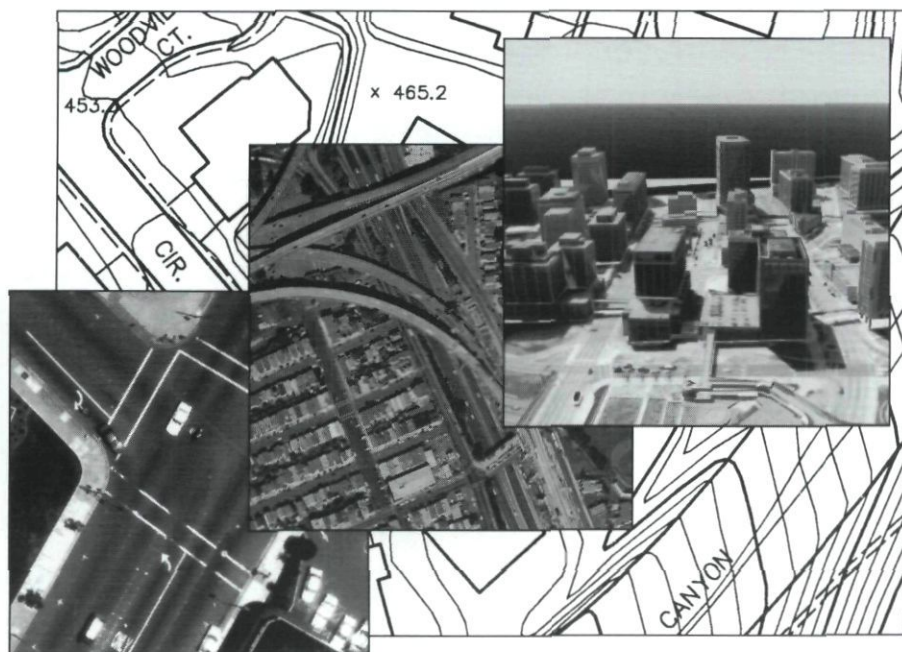
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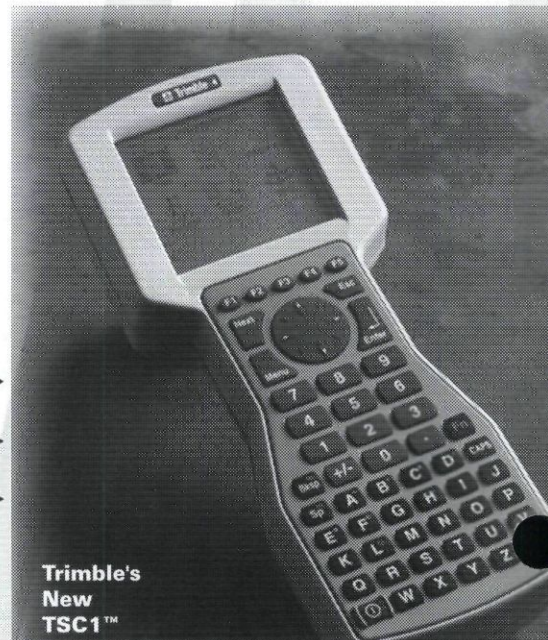
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■ **LOCAL:** Your local chapter represents you in local issues. Through your chapter representative to the State Board of Directors, the individual member can direct the course CLSA will take. ■ **STATE:** The Surveyor is represented at the state level through an active legislative program, legislative advocate, and liaison with the State Board of Registration. ■ **REGIONAL:** CLSA is an active member of the Western Federation of Professional Surveyors. This Federation is composed of associations throughout the western United States and addresses regional issues. ■ **NATIONAL:** Through institutional affiliation with the National Society of Professional Surveyors and the American Congress on Surveying and Mapping, CLSA is represented at the national level.

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CLSA presents annual conferences which provide technical and business programs, as well as exhibits of the latest in surveying and computing technology. Seminars and workshops are presented to assist in continuing education. CLSA publishes the California Surveyor magazine and the CLSA NEWS to keep the membership abreast of changing legislation, legal opinions, and other items which affect our profession.

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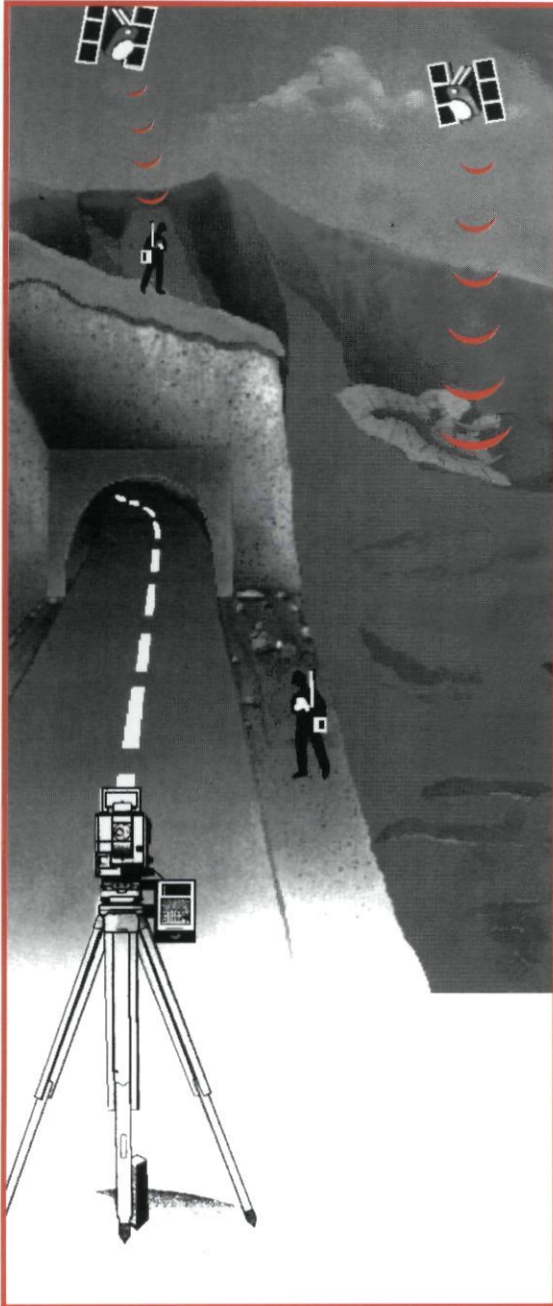
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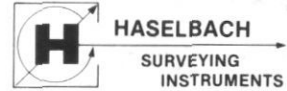
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